



A model-driven approach to studying dissociations between body size mental representations in anorexia nervosa



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ABSTRACT

This study compared dissociations between mental representations of current, ideal and normal body sizes (i.e., Current BS, Ideal BS and Normal BS) for women with anorexia nervosa (AN group, $n=56$) and healthy women (control group, $n=56$). Along the lines of the single channel model of Cornelissen et al. (2013), the discrepancy between Current BS and BMI for both groups was adequately described along a common linear continuum of Current BS (mis)perception. Body size mental representations were ranked similarly (Ideal BS < Current BS < Normal BS) in each group. Whilst the over-estimation of Current BS was much greater among the AN group than the control group, body dissatisfaction was better explained by Current BS for the AN group and by BMI for the control group. Dissociation between Current BS and participants' BMI appears to be a key element when seeking to understand AN.

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1. Introduction

Body image disturbance, defined by the DSM-V as a distorted evaluation of personal body size (American Psychiatric Association, 2013), appears to be the main factor in anorexia nervosa (AN) (see Stice, 2002 for a review; Tury, Güleç, & Kohls, 2010). This disturbance comprises two components: a perceptual component (i.e., an inability to accurately estimate body size) and an attitudinal component (i.e., a subjective body dissatisfaction combined with negative attitudes to weight and shape; Cornelissen, Johns, & Tovée, 2013). Previous studies have investigated the perceptual component, highlighting the fact that women with AN tend to over-estimate their current body size (Current BS) compared with healthy women (Striegel-Moore et al., 2004; Tovée, Benson, Emery, Mason, & Cohen-Tovée, 2003). In turn, this over-estimation impacts on the attitudinal component, with greater body dissatisfaction found among women with AN than in healthy women (Hrabosky et al., 2009). Such dissatisfaction contributes to a concomitant drive for thinness, i.e., the desire for an ultra-thin ideal body size (Ideal BS) (American Psychiatric Association, 2013; Stice, 2002). Previous

studies have mainly chosen to assess the attitudinal component of body dissatisfaction using, for example, the Body Shape Questionnaire (Cooper, Taylor, Cooper, & Fairburn, 1986) or the BD-Eating Disorder Inventory-2 (Garner, 1991). Conversely, we decided to use a Figure Rating Scale (FRS) in order to maintain a common reference for examining body size mental representations.

Most existing studies of body image disturbance have assessed body image mental representations in two different ways, using either a FRS or video distortion techniques. A FRS offers an easy-to-administer self-reported measure of body image and is often used in clinical studies. In addition, there are attempts to link FRS responses to an objective measurement scale of body size such as the Body Mass Index (BMI) (Bulik et al., 2001; Francisco, Narciso, & Alarcao, 2012; see Swami, Salem, Furnham, & Tovée, 2008a for more details). With more sophisticated techniques, such as the video distortion technique (Collins, 1986), participants can modulate a photograph of their own silhouette displayed on a screen. Different versions of a participant's body can be created by manipulating the photograph in order to measure how participants 'see' themselves (Mussap & Salton, 2006). The distortion is thus quantified in terms of a percentage variation. However, with no reference to the participant's BMI, it is difficult to draw any definite conclusions about the over-estimation of Current BS. Likewise, in recent years, computer advances have helped create photorealistic 3D silhouettes of women, thus allowing participants to interactively vary

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shape characteristics (Crossley, Cornelissen, & Tovée, 2012). Using the methodology put forward by Tovée and Cornelissen (1999), it is possible for BMI to be inferred from the surface of a 2D body silhouette and from its volume when in 3D. In the initial 1999 study, the authors measured the path length around the perimeter of 2D body images and divided each by the area within its perimeter in order to measure the perimeter area ratio. This ratio appears to be highly correlated with the actual BMI of women to whom the images belong. Using this method, Cornelissen et al. (2013) studied the way in which women with and without AN estimate their BMI in terms of Current BS. They compared two models (i.e., the single channel model and the dual channel model) to examine whether participants' BMI estimation varies as a linear function of their actual BMI (see Fig. 1). The single channel model predicts that the relationship between estimated BMI (i.e., Current BS) and actual BMI for women with and without AN is adequately described along a common linear continuum, with one intercept and one slope for all women. This model explains the difference in BMI estimation between women

with and without AN, using samples from the same unimodal distribution of a single perceptual process. Women with AN have a lower BMI than healthy women; thus, both groups stand along opposite ends of the same distribution (see Fig. 1). In contrast, the dual channel model predicts that the relationship between Current BS and participant's BMI is better explained by distinct linear trends, with a different intercept for women with AN than for healthy women. Estimates of Current BS for the latter group would be accurately proportional to their BMI, whereas women with AN would show a systematic over-estimation bias of their Current BS (i.e., same slope but a higher intercept).

Cornelissen et al. (2013) showed that Current BS over-estimation of women with and without AN is not qualitatively different; indeed, it is consistent with a single channel model. Moreover, Current BS mental representation is better explained in relation to the participants' BMI rather than their subjective attitude toward weight and shape (i.e., attitudinal component).

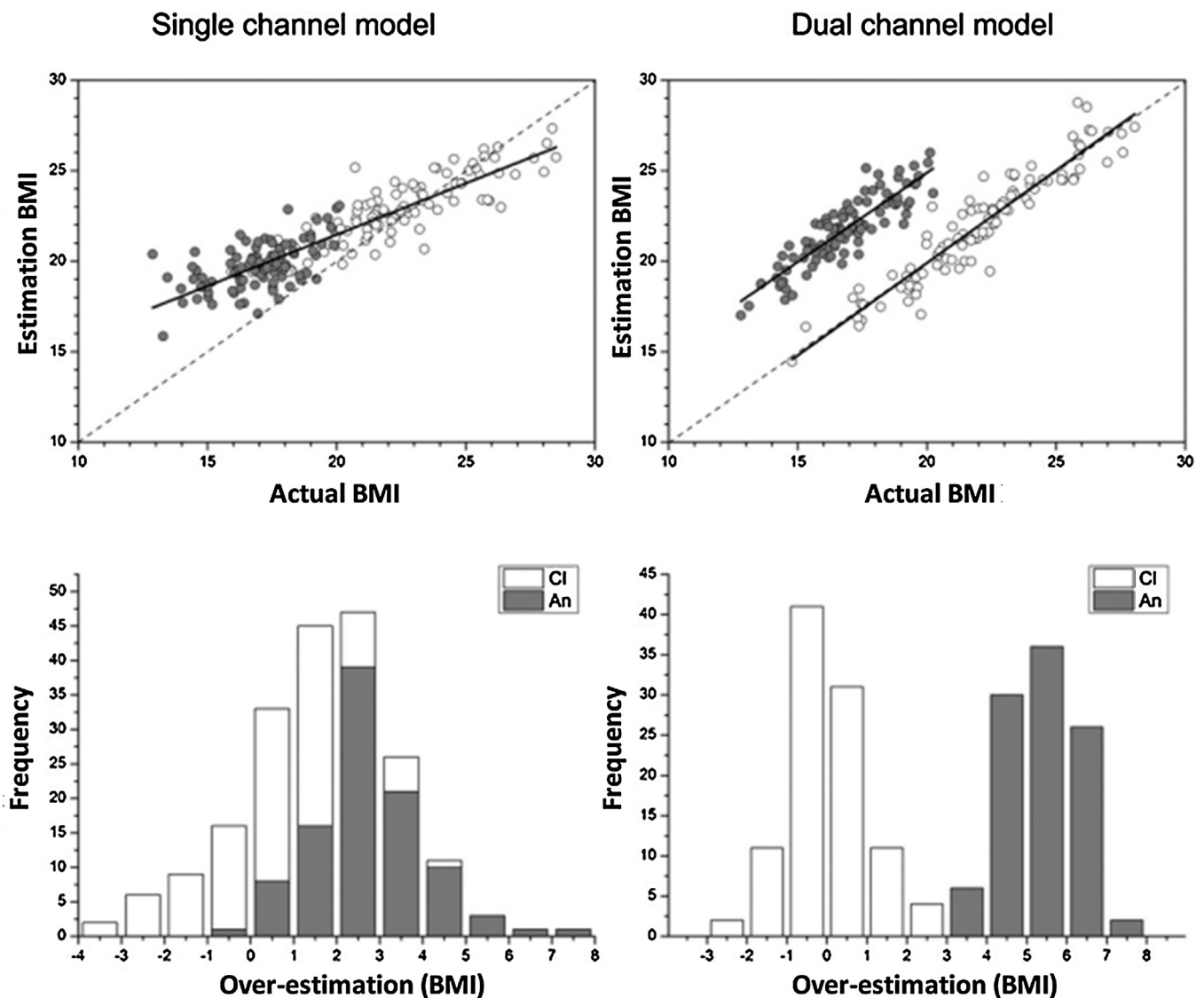


Fig. 1. Illustration of the single and dual channel models using simulated data; taken from Cornelissen et al. (2013).

The top row of figures shows, for each model, the scatterplots of estimated Body Mass index (BMI) as a function of actual BMI for the AN group (filled dots) and the control group (empty dots). In each case, the dotted line represents veridical performance. The bottom row of figures shows the distributions of the difference between estimated and actual BMI (under/over estimation) for each model. In the first case, the distribution is unimodal, which is consistent with a single psychophysical process distributed continuously throughout the population. In the second case, there are two distributions, which is consistent with normal (white bars) vs. pathological (grey bars) psychophysical performance, under a dual-channel hypothesis.

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